

Also, in the Official Action (paragraphs 2-3), the Examiner rejected Claims 1, 3-5, and 7-12 as being unpatentable over Nagle et al. '028 in view of Nilsson et al. '144. Applicants respectfully disagree for numerous reasons. First, the Examiner states in the Official Action that Nagle et al. '028 includes the steps of: "forming a perform from wood; drying the perform; pyrolyzing the perform (sic); reshaping the perform (sic) by machining; and infusing the perform (sic) with silicon to form the silicon carbide item." Applicants, however, respectfully submit that the Examiner's statement is not an accurate characterization of Applicants' rejected claims. Clearly, the language used by the Examiner is not the language used in Applicants claims. For example, Claims 1, 3-5, and 7-12 never use the language "drying the perform" or "reshaping the perform (sic) by machining" as suggested by the Examiner. Additionally, the Examiner's statements suggest that these claims simply require "pyrolyzing the perform (sic)," but this is not accurate either. Instead, these claims feature the step of "heating the preform to a second temperature in a furnace at atmospheric pressure to pyrolyze the preform, the second temperature being higher than the first temperature[.]" This specific language as used by Applicants was not referenced in the Examiner's basis for the rejection. In other words, Applicants respectfully submit that the Examiner's statements mischaracterized the language found in the rejected claims.

Second, the Examiner admits that Nagle et al. '028 fails to teach or suggest that "drying takes place in an autoclave." Applicants, however, respectfully submit that the language of Claim 1 requires "heating the preform under pressure to a first temperature in an autoclave" and does not specifically state "drying takes place in an autoclave" as suggested by the Examiner. Clearly, this mischaracterizes the language from the rejected claims as well. This is impermissible.

Accordingly, Applicants respectfully submit that, on this basis, the Examiner has failed to set forth a proper prima facie case for a 35 U.S.C. § 103 rejection as required. For a proper 35 U.S.C. § 103 rejection, the Examiner has the burden of coming forward with evidence where each and every element of a claim can be found in either one or a combination of prior art documents. This has not occurred. For example, misstatements, cursory, or summary statements about what is found in a patent documents suggesting that this is what is claimed clearly do not satisfy this burden. Also, Applicants respectfully submit that the Examiner has failed to state

where in Nagle et al. '028 (as well as Nilsson et al. '144) Applicants featured elements of the rejected claims can be found (either for the Examiner stated rejection or for the proper language found in the elements of the claims), and Applicants respectfully submit that this was not done because these cited patents fail to include Applicants featured elements of the claims. Therefore, Applicants submit that for these reasons, the rejection of Claims 1, 3-5, and 7-12 under 35 U.S.C. § 103 (paragraphs 2-3) was improper and should be withdrawn. Because the same underlying rejection was the basis for rejecting dependent Claim 2 in the Official Action (paragraph 4) and dependent Claim 6 in the Official Action (paragraph 5), the rejection of these claims likewise was improper. These additional rejections should be withdrawn as well.

Further, Applicants respectfully submit that the purpose of Nagle et al. '028 is to produce large crack-free charcoal (col 8, lines 2-3) and discloses a technique forming carbonized wood to make charcoal type products. Applicants claimed invention, on the other hand, has a purpose of forming a silicon carbide item. Although Nagle et al. '028 discloses in its background how attempts to make silicon carbide items have used processes related to wood, the focus of the Nagle et al. '028 patent is the charcoal formation and not silicon carbide items. As such, the techniques for forming the silicon carbide items as claimed by Applicants are going to be quite different and are quite different from those disclosed in Nagle et al. '028. Also, because the purposed are clearly different, the brief discussion in the background of Nagle et al. '028 related to silicon carbide fails to disclose the processes of the claimed invention and fails to discount the novelty and the nonobviousness of the claimed invention. For example, Nagle et al. '028 at least fails to teach or suggest either the steps of "heating the preform under pressure to a first temperature in an autoclave" or "heating the preform to a second temperature in a furnace at atmospheric pressure to pyrolyze the preform, the second temperature being higher than the first temperature" as featured in Claim 1. Nagle et al. '028, in contrast to the claimed invention, discloses kiln drying cut wood precursors (col. 18, lines 3-7) and heating the piece of wood in an inert atmosphere to achieve carbonization (col. 18, lines 21-23). This is not heating a perform under pressure to a first temperature in an autoclave. In other words, because the purposes are different, the techniques for forming the items are going to be quite different. So, when "properly" analyzed, Nagle et al. '028 fails to disclose, teach, or suggest many elements of the

claimed invention, and Nilsson et al. '144 also fails to make up for these deficiencies of Nagle et al. '028 being used as a prior art document to reject the claims.

Nilsson et al. '144, for example, discloses a two stage process for drying of raw wood for the manufacturing of wood based boards such as particle boards or oriented strand boards. The purpose of Nilsson et al. '144 clearly is not to use wood to form silicon carbide items as set forth in the claimed invention. As such, Nilsson et al. '144 likewise is going to and does have different process steps for achieving its purpose than the claimed invention. Accordingly, the deficiencies of Nagle et al. '028 are not going to be found in Nilsson et al. '144.

Also, one skilled in the art would have no motivation to combine the teachings of a patent document related to charcoal (Nagle et al. '028) with a patent document related to forming particle boards (Nilsson et al. '144) to somehow arrive at an invention for making silicon carbide items. With all respect, the leap is just too great. Clearly, improper hindsight is being used by using Applicants' claimed invention as a roadmap and then trying to improperly piecemeal sections of Nagle et al. '028 with Nilsson et al. '144 to somehow arrive at the claimed invention. For example, in the background section of Nilsson et al. '144, the prior art is described as heating raw wood to secure destruction of the volatile organic compounds (VOC) where the exhaust gases themselves (and notably not the raw wood itself) are heated to two different temperatures by a complicated and costly system (col. 1, lines 35-50). This is important to note because this background section fails to teach or suggest the claimed invention and sets up the problem/purpose toward which the remaining sections of the Nilsson et al. '144 document is trying solve, namely "[t]he primary aim of the [Nilsson et al. '144] invention is to provide a method for drying wood raw material, comprising a destruction of VOC evaporated during the drying with a more efficient use of energy, and lower investment needs." (Col. 1, lines 66-67; col. 2, lines 1-2). This purpose or "primary aim" is completely different than forming silicon carbide items. In order to address the "primary aim" as set forth in Nilsson et al. '144, the Nilsson et al. '144 patent document discloses that the raw wood material is dried in at least two sub-steps so that the drying is controlled to remove all of the VOC from the wood during one sub-step and the VOC is separated from the remaining process gases (col. 2, lines 20-26).

Like the process described in the background section of Nilsson et al. '144, the VOC gas is then heated and passed to a reactor in an attempt to destroy the VOC in the gas. In the second

sub-step, the remaining, e.g., non-VOC, gases are removed and treated so that the two-step process significantly reduces the amount of gas to be processed (col. 2, lines 35-42). Again, the purposes/aim/problems are completely different than the claimed invention. Nilsson et al. '144 goes on to state that the raw wet wood passes through two drying devices or drying chambers, e.g., drying ovens or autoclaves, for the purpose of removing the VOC gas at one drying device by combining the VOC gas with another combustion gas supplied to the drying device by a gas generator. The combined or processed gas is then vented from the drying device, introduced to a reactor to destroy the VOC gases, and the exhaust gas from the reactor is then introduced to the second drying device as the wood passes through it. There is no teaching in Nilsson et al. '144, for example, of "forming a preform from wood" as taught by the claimed invention. Instead, Nilsson et al. '144 treats raw wet wood. There is no teaching in Nilsson et al. '144 of "heating the preform under pressure to a first temperature in an autoclave" and "heating the preform to a second temperature in a furnace at atmospheric pressure, the second temperature being higher than the first temperature[.]" because, first of all, no preform is taught at all and because nothing in Nilsson et al. '144 teaches heating the raw wet wood "under pressure to a first temperature in an autoclave[.]" and then heating the raw wet wood "to a second (higher) temperature in a furnace at atmospheric pressure to pyrolyze the preform[.]" In other words, the statements merely setting forth that the two drying devices can be drying ovens or autoclaves in Nilsson et al. '144 does not somehow magically make the Nilsson et al. '144 disclose or make obvious the clearly different process of the claimed invention. Nilsson et al. '144 fails to teach using an autoclave to heat a preform under pressure to a first temperature in an autoclave and heating the preform to a second higher temperature at atmospheric pressure in a furnace to pyrolyze the preform.

Instead, Nilsson et al. '144 makes no distinction between the devices, makes no distinction between the pressures, and makes no distinction between the temperatures. Why would this be? Again, because Nilsson et al. teaches a completely different purpose/aim/problem addressed by its process described therein, namely to remove and destroy the VOC in the raw wet wood. This process taught by Nilsson et al. '144 is so completely different from the process of the claimed invention that clearly one skilled in the art would have no motivation to combine it with the processes described in Nagle et al. '028 to somehow (using

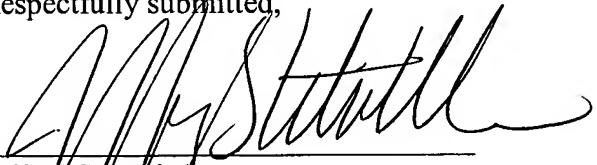
improper hindsight) arrive at the claimed invention, including the steps of “heating the preform under pressure to a first temperature in an autoclave” and “heating the preform to a second temperature in a furnace at atmospheric pressure to pyrolyze the preform, the second temperature being higher than the first temperature[.]” In other words, when light is shed on actually what Nagle et al. ‘028 and Nilsson et al. ‘144 teach, at least these steps of the claimed are still not found in either patent document, namely because the purposes are different from each other, e.g., charcoal vs. particle board, and from the claimed invention, e.g., silicon carbide items.

Finally, Applicants also respectfully disagree with the Examiner’s comments related to temperatures being obvious in view experimentation. This simply is not true, especially when the process of the cited art are so different and when the selected temperatures achieve specific results to accomplish a desired result in the item which is not taught in the art. When this occurs, for a proper prima facie 35 U.S.C. § 103 rejection, the Examiner has the burden of providing evidence that the temperature of the prior art achieves the same result as desired by the claimed invention. This has not been done by the Examiner, and the cited references simply do not recognize or accomplish this. The other patents cited with respect to Claim 2 (paragraph 4) and Claim 6 (paragraph 5) also fail to make up for the deficiencies found in Nagle et al. ‘028 and Nilsson et al. ‘144. Therefore, for these reasons as well, Applicants respectfully submit that the Examiner has not set forth a proper prima facie case to support a 35 U.S.C. § 103 rejection, that Claims 1-12 are nonobvious, and that Claims 1-12 define over the cited art.

**CONCLUSION**

In view of the amendments to the claims made without prejudice and the remarks set forth above, Applicants respectfully submit that Claims 1-35 are novel and nonobvious and define over the cited art. Accordingly, Applicants respectfully request that a Notice of Allowance be issued in due course.

Respectfully submitted,

  
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**ATTACHMENT A**

**Marked-Up Version of Amended Claims (as of 1/23/2003)**

1. (Amended) A method of forming a silicon-carbide [items]item, the method comprising:
  - (a) forming a preform from wood, then
  - (b) heating the preform under pressure to a first temperature in an autoclave, then
  - (c) heating the preform to a second temperature in a furnace at atmospheric pressure to pyrolyze the preform, the second temperature being higher than the first temperature; and then
  - (d) infusing the preform with a liquid containing silicon for forming a silicon-carbide item that retains the shape of the preform.
2. (Amended) The method of claim 1, wherein:  
in step (d), the liquid is [a] an alloy, and wherein the liquid infiltrates pores of the preform.
4. (Amended) The method of claim 1, further comprising:  
after step (c) and before step (d), machining the preform to net-shape dimensions to thereby account for changes in the perform caused by pyrolization.
5. (Amended) The method of claim 1, wherein:  
step (a) comprises forming the preform from a solid block of wood, wherein a vacuum is applied to substantially surround the perform prior to the step of heating the perform under pressure in the autoclave, and wherein the pressure in the autoclave minimizes temperature gradients in the autoclave and in the perform to thereby maintain dimensional stability in the preform.
6. (Amended) The method of claim 1, wherein:  
step (a) comprises forming the preform from wood particles and binders, wherein a vacuum is applied to substantially surround the perform prior to the step of heating the perform under pressure in the autoclave, and wherein the pressure in the autoclave minimizes temperature

gradients in the autoclave and in the perform to thereby maintain dimensional stability of the preform.

10. (Amended) The method of claim 1, wherein:

step (b) comprises increasing the temperature of the autoclave from a starting temperature to the first temperature at a maximum rate of 5°C per minute, and wherein the temperature is increased to a level to cause bio-oil to emerge from the preform.

11. (Amended) The method of claim 1, wherein:

step (c) comprises increasing the temperature of the furnace from a starting temperature to the second temperature at a maximum rate of 5°C per minute, wherein the furnace includes an inert gas being used therein to prevent combustion, and the method further comprising cooling the perform under constantly flow of the inert gas prior to step (d).

13. (Amended) The method of claim 1, further comprising machining a recess into an upper surface of the perform after the perform is formed and prior to the step of heating the perform under pressure, and wherein step (b) comprises:

covering the preform with a vacuum bag and evacuating air from the bag; then  
heating the preform and vacuum bag to a drying temperature lower than the first temperature; then  
removing the vacuum bag and heating the preform to the first temperature.

14. (Amended) A method of forming a silicon-carbide [items] items, the method comprising:

- (a) forming a preform from wood, then
- (b) covering the preform with a vacuum bag and evacuating air from the bag; then
- (c) heating the preform and vacuum bag under pressure to a drying temperature in an autoclave; then
- (d) removing the vacuum bag and heating the preform under pressure to a first temperature in the autoclave, the first temperature being higher than the drying temperature; then



(e) heating the preform to a second temperature in a furnace at atmospheric pressure to pyrolyze the preform, the second temperature being higher than the first temperature; and then

(f) infusing the preform with a liquid containing silicon for forming a silicon-carbide item that retains the shape of the preform.

15. (Amended) The method of claim 14, wherein:

in step (f), the liquid is [a] an alloy.

26. (Amended) A method of forming a composite [components] component, the method comprising:

(a) forming a preform from wood, the preform being shaped as a mold; then

(b) pyrolyzing the preform; then

(c) infusing the preform with liquid containing silicon; then

(d) holding the infused preform at a selected temperature to form a silicon-carbide tool that retains the shape of the preform, the tool having at least one tooling surface for receiving layers of composite material; then

(e) applying the layers of composite material to the tooling surface to form the component; then

(f) curing the component on the tooling surface; and then

(g) removing the cured component from the tool.

27. (Amended) The method of claim 26, wherein:

in step (c), the liquid is [a] an alloy.